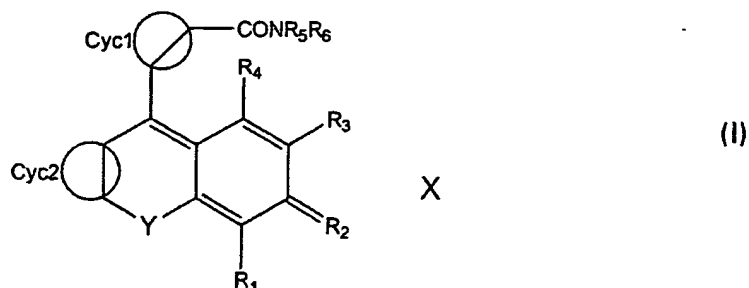


What is claimed is:

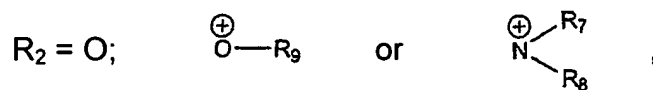
1. A carboxamide-substituted dye of the formula (I)



in which

Y = oxygen, sulfur, selenium,  $CR_aR_b$ ,  $NR_c$ , a direct linkage or is  $-R_{14}$  and  $-R_{15}$ ;

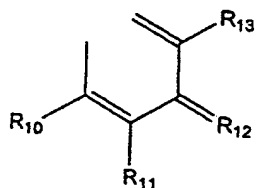
$R_1$ ,  $R_3$ ,  $R_4$  are independently hydrogen, halogen,  $-O^\ominus$ , a hydroxyl group, thiol group, amino group, ammonium group, sulfo group, phospho group, nitro group, carbonyl group, carboxyl group, a carboxylic acid derivative, a nitrile group, isonitrile group, cyanate group, isocyanate group, thiocyanate group, isothiocyanate group or a straight-chain, branched or cyclic saturated or unsaturated hydrocarbon group having up to 40 carbon atoms;  $R_a$ ,  $R_b$ ,  $R_c$  and  $R_{14}$ ,  $R_{15}$  independently are as defined for  $R_1$ ,  $R_3$ ,  $R_4$ ;



in which

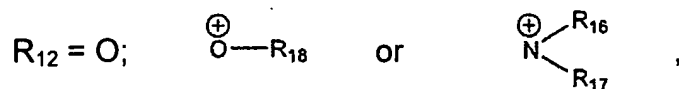
$R_7$ ,  $R_8$ ,  $R_9$  independently are hydrogen or a straight-chain, branched or cyclic saturated or unsaturated hydrocarbon group having up to 40 carbon atoms; or

$R_1$  together with  $R_2$  is



in which

$R_{10}$ ,  $R_{11}$ ,  $R_{13}$  are as defined for  $R_1$ ,  $R_3$ ,  $R_4$ ;



in which

$R_{16}$ ,  $R_{17}$ ,  $R_{18}$  are as defined for  $R_7$ ,  $R_8$ ,  $R_9$ ;

$R_5$ ,  $R_6$ , independently are a straight-chain, branched or cyclic saturated or unsaturated hydrocarbon group having up to 40 carbon atoms;

Cyc1 is an organic moiety which comprises a ring system selected from aromatic, heteroaromatic, quinoidal and cycloaliphatic rings;

Cyc2 is an organic moiety which comprises a ring system selected from aromatic, heteroaromatic, quinoidal and cycloaliphatic rings;

each of said moieties in the dye of the formula (I) being able to form a ring system with one or more neighboring moieties;

and X being one or more mono- or multivalent anions, when required for balancing the charge;

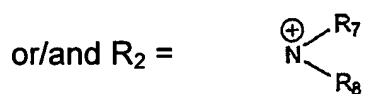
with the proviso that

- Y = oxygen,

- Cyc1 = phenyl or substituted phenyl,
  - Cyc2 = hydroxyl-, ether- or ester-substituted phenyl
- and
- $R_2 = O$

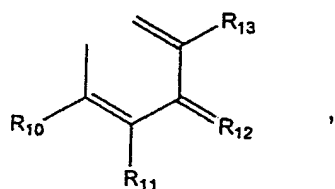
do not appear in the formula (I) at the same time.

2. The carboxamide-substituted dye as claimed in claim 1, in which Cyc2 is a nitrogen-containing heterocycle or a ring system substituted with at least one amino group



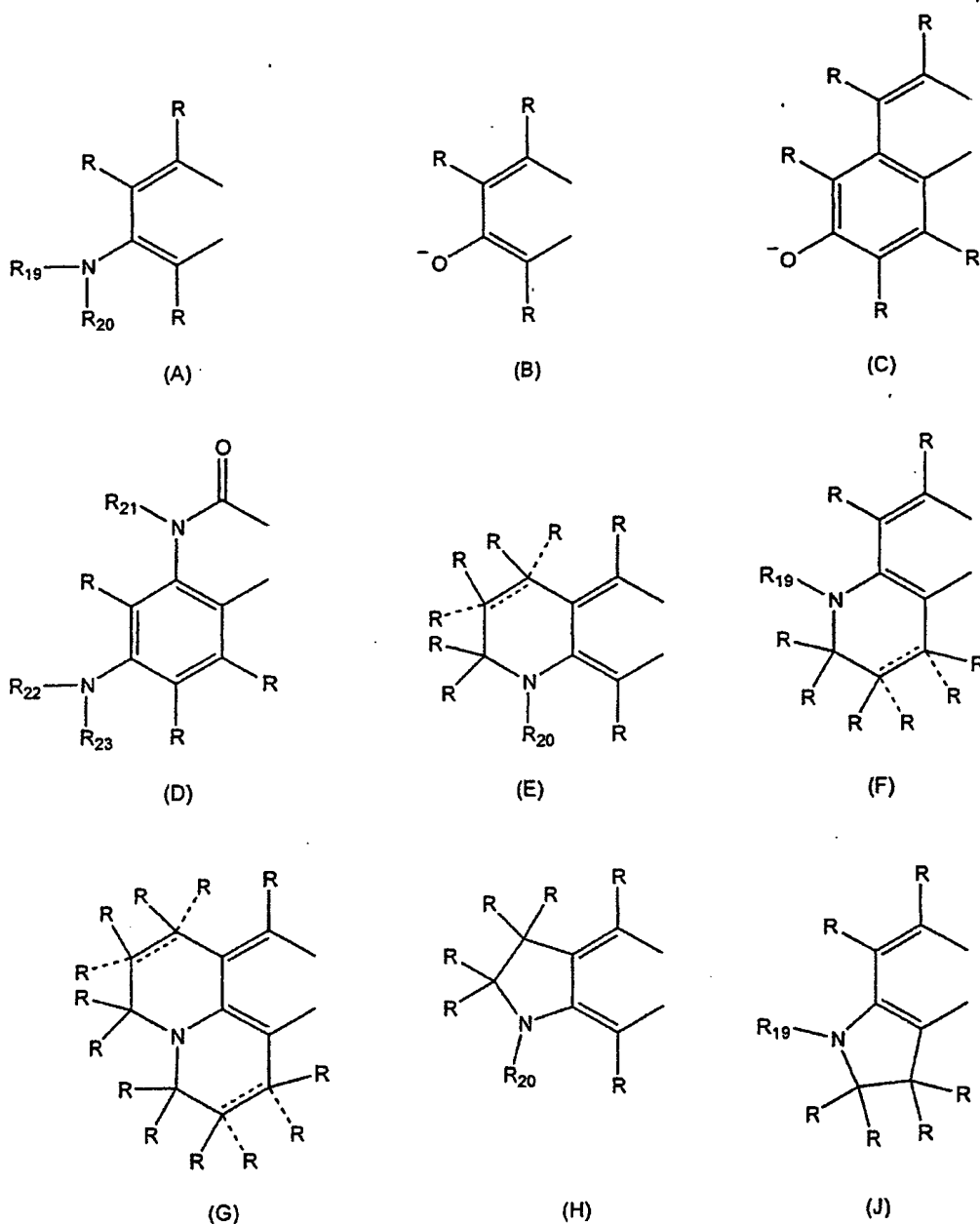
or,

together with  $R_1 =$



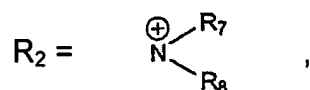
in which  $R_7, R_8, R_{10}, R_{11}, R_{13}$  and  $R_{16}, R_{17}$  are as defined in claim 1.

3. The carboxamide-substituted dye as claimed in claim 1 or 2, in which Cyc2 in the formula (I) has a structure (A), (B), (C), (D), (E), (F), (G), (H) or (J),



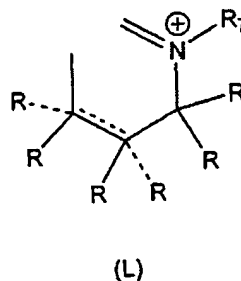
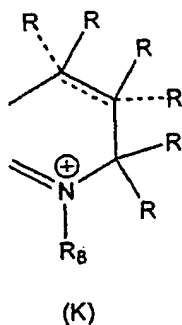
in which R in each case independently is defined as  $\text{R}_1$ ,  $\text{R}_3$ ,  $\text{R}_4$  in claim 1;  $\text{R}_{19}$ ,  $\text{R}_{20}$  and  $\text{R}_{22}$ ,  $\text{R}_{23}$  are independently defined as  $\text{R}_7$ ,  $\text{R}_8$  in claim 1; and  $\text{R}_{21}$  is defined as  $\text{R}_7$  in claim 1 and the dashed lines are optionally double bonds in the presence of which the moieties bound via a dashed line are absent.

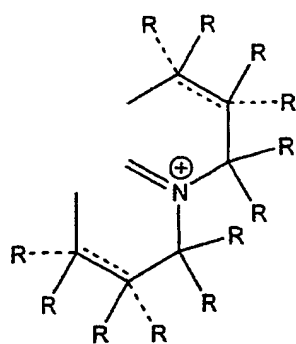
4. The carboxamide-substituted dye as claimed in any of the preceding claims, in which Cyc1 is substituted or unsubstituted phenyl, naphthyl, pyridyl or cyclohexyl.
5. The carboxamide-substituted dye as claimed in any of the preceding claims, in which



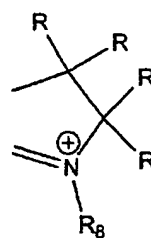
where  $R_7$  and  $R_8$  are as defined in claim 1.

6. The carboxamide-substituted dye as claimed in claim 5, in which  $R_1$  is bridged with  $R_8$  or/and  $R_3$  is bridged with  $R_7$  and forms a ring system.
7. The carboxamide-substituted dye as claimed in claim 6, in which the ring system/s comprise(s) 5- or 6-membered rings.
8. The carboxamide-substituted dye as claimed in claim 7, in which a ring system of the structure (K), (L), (M), (N) or (O) is formed:

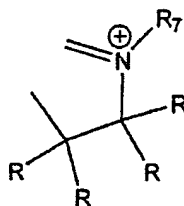




(M)



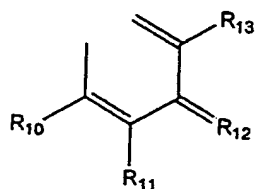
(N)



(O)

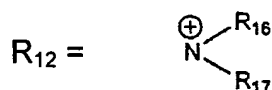
in which R in each case independently is defined as R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>7</sub>, R<sub>8</sub> are as defined in claim 1,  
and the dashed lines are optionally in the presence of which the moieties bound via a dashed line are absent.

9. The carboxamide-substituted dye as claimed in any of claims 1 to 4, in which  
R<sub>2</sub> together with R<sub>1</sub> is



where  $R_{10}$ - $R_{13}$  are as defined in claim 1.

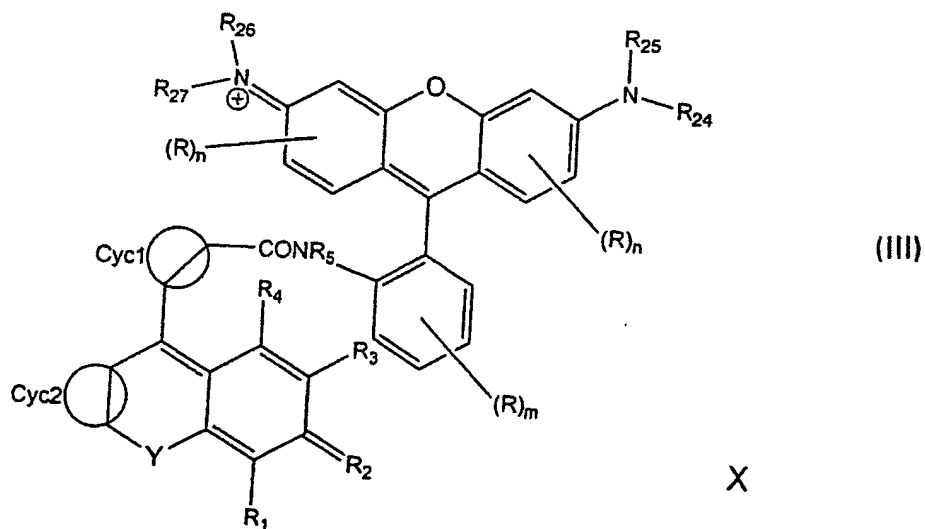
10. The carboxamide-substituted dye as claimed in claim 9, in which  $R_{12} = O$ .
11. The carboxamide-substituted dye as claimed in claim 9, in which



where  $R_{16}$  and  $R_{17}$  are as defined in claim 1.

12. The carboxamide-substituted dye as claimed in any of the preceding claims, in which  $Y = \text{oxygen}$ .
13. The carboxamide-substituted dye as claimed in any of claims 1 to 11, in which  $Y = \text{sulfur, selenium or } CR_aR_b$ ,  $R_a$  and  $R_b$  being as defined in claim 1.
14. The carboxamide-substituted dye as claimed in any of claims 1 to 11, in which  $Y = r$  moieties  $-R_{14}$  and  $-R_{15}$ ,  $R_{14}$  and  $R_{15}$  being as defined in claim 1.
15. The carboxamide-substituted dye as claimed in claim 8, in which Cyc1 is optionally substituted phenyl, Cyc2 has the structure (E) and  $Y = \text{oxygen}$  and  $R_7$  and  $R_3$  form a ring system (K),  $R_7$  and  $R_3$  being as defined in claim 1.

16. The carboxamide-substituted dye as claimed in claim 8, in which Cyc1 is optionally substituted phenyl, Cyc2 has the structure (A) and Y = sulfur, selenium or CR<sub>a</sub>R<sub>b</sub>, R<sub>a</sub> and R<sub>b</sub> being as defined in claim 1.
17. A multichromophore system in which a carboxamide-substituted dye as claimed in any of claims 1 to 16 is coupled via R<sub>5</sub> or/and R<sub>6</sub> to one or more further dye molecules, R<sub>5</sub> and R<sub>6</sub> being as defined in claim 1.
18. The multichromophore system as claimed in claim 17, in which the one or more further dye molecules are carboxamide-substituted dyes as claimed in any of claims 1 to 16.
19. The multichromophore system as claimed in claim 18, in which coupling takes place on R<sub>5</sub> or/and R<sub>6</sub> of the further carboxamide-substituted dyes, R<sub>5</sub> and R<sub>6</sub> being as defined in claim 1.
20. The multichromophore system as claimed in claim 17 of the formula (III)



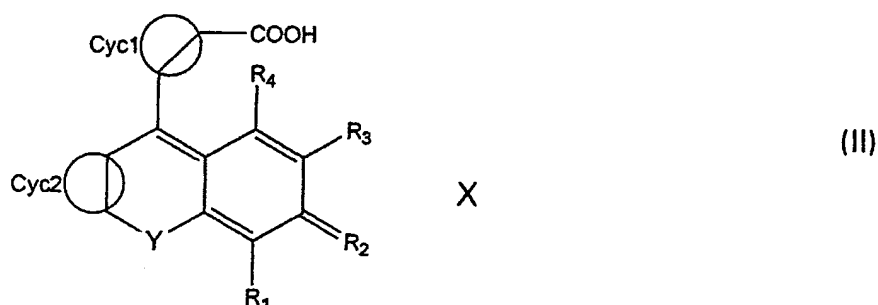
where the moieties are as defined in claim 1, R in each case independently



is defined as  $R_1$ ,  $R_3$ ,  $R_4$  and  $R_{24}$ ,  $R_{25}$  and  $R_{26}$ ,  $R_{27}$  are defined as  $R_7$ ,  $R_8$  in claim 1, with  $n$  independently being 0, 1, 2 or 3 and  $m$  being 0, 1, 2, 3 or 4.

21. A process for preparing carboxamide-substituted dyes of the formula (I) as claimed in any of claims 1 to 16, comprising the following steps:

(a) converting the carboxyl group of a dye of the formula (II)



in which the moieties are defined as indicated in claim 1, into an activated form;

- (b) reacting the activated dye obtained in step (a) with a secondary amine  $\text{HNR}_5\text{R}_6$ ; and  
 (c) optionally isolating the carboxamide-substituted dye of the formula (I) obtained in step (b).

22. The process as claimed in claim 21, in which step (a) is carried out at temperatures of from room temperature to  $60^\circ\text{C}$ .
23. The process as claimed in claim 21 or 22, in which an aprotic solvent is used in step (b).
24. The process as claimed in any of claims 21 to 23, in which N-hydroxysuccinimide, N-hydroxyphthalimide, N-hydroxynaphthalimide, O-(N-succinimidyl)-N,N,N',N'-tetramethyluronim tetrafluoroborate (TSTU) are used for activation.

25. The use of a carboxamide dye as claimed in any of claims 1 to 16 for qualitative or/and quantitative determination of an analyte.
26. The use as claimed in claim 25, in which the carboxamide-substituted dye of the formula (I) is coupled to the analyte to be detected or/and to a component of a detection reagent or/and to a support.
27. The use as claimed in claim 25 or 26, in which detection comprises an immunological detection or/and detection by way of nucleic acid hybridization.
28. A conjugate of a carboxamide-substituted dye of the formula (I) as claimed in any of claims 1 to 16 and a binding partner.
29. The conjugate as claimed in claim 28, in which the binding partner is selected from among peptides, polypeptides, nucleic acids, nucleosides, nucleotides, nucleic acid analogs and haptens.
30. The use of a conjugate as claimed in claim 28 or 29 in nucleic acid hybridization processes and immunochemical processes.
31. The use as claimed in claim 26 or 27, in which coupling to the analyte to be detected or/and the component of a detection reagent or/and the support takes place via the substituents  $R_5$  or/and  $R_6$  of the carboxamide-substituted dye of the formula (I), the moieties  $R_5$  and  $R_6$  being as defined in claim 1.
32. The use as claimed in claim 31, in which coupling is carried out via a covalent bond.